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XLV.—*Preliminary Account of the Freshwater Medusa of Lake Tanganyika.* By R. T. Günther, B.A.

[Plates XIII. & XIV.]

In August 1891 Mr. F. L. M. Moir, Manager of the African Lakes Company, informed Dr. A. Günther that he had observed Medusæ in large numbers in one of the bays of Lake Tanganyika. "They were about ¾ of an inch in diameter, and their rounded top was so clear as to give the idea they were merely circular bodies and not the shape of an ordinary Medusa; the more opaque ovaries gave this appearance." At the same time Mr. Moir kindly undertook to obtain specimens properly prepared with osmic acid; and, thanks to the assistance of Mr. A. J. Swann, these specimens arrived in good condition at the end of last year. This material was placed by my father in my hands for examination and description.

Although Mr. Moir has thus the merit of having been the first to succeed in having specimens brought to Europe, he is not the original discoverer of the species. In fact, from April and during our summer months the Medusæ seem to be exceedingly abundant about the bays of the lake, so much so, that they attract the notice of all visitors.

In December 1883 Professor E. von Martens * communi-

* Sitzgsb. naturf. Fr. Berl. 1883, p. 197.

cated to the 'Gesellschaft naturforschender Freunde zu Berlin' the substance of a letter from Dr. R. Böhm, then travelling in Africa, relating to the discovery of a Craspedote Medusa in Lake Tanganyika. The information to be gathered from Böhm's account was restricted to the following points:—that the Medusa was provided with a velum; that it had a small short broad stomach, at the base of which the genital organs are situated; and, finally, that the tentacles were very numerous and of unequal length. On account of the complete physical isolation of Lake Tanganyika from all other localities from which Medusæ are known, Böhm very justly considered the newly discovered species to be unknown to science, and accordingly proposed the specific name of *tanganjicæ*, leaving the generic name, and at the same time deploring that the absence of all necessary literature prevented him from further determining the zoological position of the species.

Evidently the same animal has since been observed by H. von Wissmann, who, when describing his passage across the lake on the 13th of April, 1887*, says, "I was greatly astonished to observe a number of sea-nettles surround our boat for about half an hour. They were transparent, of the shape of a disk, and like a mark-piece in size; round the edge was a milky circle, hanging down in fibres, by means of which they swam."

Such, then, are the sole facts which, so far as I know, have been hitherto published concerning what is probably the most aberrant of the very few freshwater Medusæ at present known to us.

The specimens were preserved in strong alcohol and were much blackened by the osmic acid which had been employed as a fixing agent, and which had acted especially upon the margin of the umbrella and the manubrium. In size the individuals varied from 1 to 1·8 centimetre across the bell, while the largest specimen was as much as 2·2 centim. in diameter.

The umbrella is characterized by its flattened shape, the diameter being about four times as large as the greatest thickness. The central portion of the umbrella, measuring about two thirds of the whole diameter, is much thickened and has the shape of a nearly hemispherical lens (Pl. XIV. fig. 4), while the peripheral portions are very much thinner. The margin of the umbrella is bent over and incurved towards the mouth. The exumbrella is smooth and covered with an epithe-

* H. von Wissmann, 'Through Equatorial Africa' (English translation), p. 253.

lium of flattened polygonal cells. The velum is well developed in some specimens, but not so conspicuous in others. The circular muscles of the velum (fig. 5, *m.v.*) are arranged on the inner side in separate concentric bands, varying in number according to the breadth of the velum. The muscle-bands near the free margin are always more highly developed than those situated near the attachment of the velum.

The gastrovascular system differs from that of all other Medusæ hitherto described in the relative size of its parts. The mouth and stomach are both circular, widely open to the exterior, and of so great a diameter—two thirds that of the umbrella—that the lips of the mouth probably never completely close the stomach in the adult animal. In all the specimens examined the central portion of the shallow stomach-cavity is almost completely filled with the large central lens-shaped boss of the umbrella (fig. 4), so that the stomach is reduced to a circular trench all round the central boss inside the manubrium, and can hardly be said to possess any central cavity at all. It might be suggested that this extraordinary condition is merely due to post-mortem changes; but the fact that the relative dimensions of the parts do not vary appreciably in any of the specimens examined, seems to me to be sufficient reason for regarding the condition described as the normal one, at any rate when the animal is not feeding. A possible explanation of this curious dilatation of the mouth and stomach was suggested to me by Mr. G. C. Bourne. It is obvious that any increase in the diameter of the mouth and stomach would involve a corresponding increase in the circumference of the manubrium, which, as will appear in the sequel, is the bearer of the reproductive organs. The large size of the mouth would appear, then, to be correlated with an enlargement of the area upon which the reproductive organs, sexual or asexual, are developed.

The slightly thickened margin of the mouth is quite simple, without processes of any kind. The radial canals are four in number in the majority of individuals; but instances of the occurrence of five or six seem to be by no means rare, specimens with six being rather more numerous than those with five. The radial canals radiate from the stomach in a more or less horizontal plane, but assume a more vertical direction just before they enter the ring-canal, in consequence of the inflexion of the margin of the umbrella. The ring-canal varies in size in different individuals; it is lined by an epithelium of small squarish cells, similar to those lining the radial canals. On the outer side of the canal, however, these cells are in very great numbers, forming a lobulated mass

projecting into and partly blocking up the lumen of the canal (fig. 5). Hollow cavities often occur in this lobulated mass of endoderm-cells.

As in *Limnocodium*, the tentacles are very numerous and may amount to over two hundred in number. In some of the smaller specimens the four primary perradial tentacles are conspicuous on account of their greater length and thickness, but in most of the larger examples they are almost equalled in point of size by the interradial and even the adradial tentacles, so that they are no longer readily recognizable. Alternating with these primary, secondary, and tertiary series tentacles of the fourth and even of the fifth and sixth orders arise with great regularity, and it is only when the seventh order of tentacles are intercalated that the typical regularity of arrangement cannot be further traced. In preserved specimens the relative length of the tentacles varies to a great extent, indicating a considerable capability of contraction and extension. The tentacles are hollow, the lumen of the larger tentacles at any rate being clearly continuous with the lumen of the ring-canal. The lumen of the tentacles is lined with large, thin-walled, columnar endoderm-cells, which are continuous with the endodermic lining of the ring-canal (fig. 5). The transition from the tentacular endoderm-cells to those of the ring-canal is very abrupt. The thread-cells are of small size and generally arranged in little wart-like groups or batteries (fig. 5), which are more or less disposed in whorls and which are especially closely set at the tips of the tentacles.

The proximal ends of the tentacles are all adnate to the margin of the umbrella for some considerable distance (figs. 4 and 5, *te.*), the older tentacles being adherent along a greater length than the younger ones. At the points of fusion the tentacles become partly imbedded in the substance of the margin of the umbrella, while the tentacular ectoderm becomes continuous with that of the exumbrella, so that in a section across the line of fusion an ectoderm lamella is seen between the mesoglœa of the tentacle and that of the umbrella (fig. 5, *ect.*).

On the side of the ring-canal opposite to that at which the tentacles arise and just external to the origin of the velum is situated a circle of sense-organs. These vary considerably in number and are arranged at irregular intervals, so that neither their number nor grouping can be brought into relation with that of the tentacles. The structure of these marginal bodies is peculiar.

They are refringent egg-shaped bodies attached to one side of a round or ovate capsule, the walls of which are lined with

a flattened epithelium (fig. 7; *s* in figs. 4 and 5). These egg-shaped bodies are composed of numerous cells and apparently attached by a thin stalk or thread to that side of the capsule which is nearest the ring-canal. The basal cells of the marginal bodies have a granular and opaque appearance, being coloured dark brown by the action of the osmic acid. The apical cells, however, are quite clear and refringent (fig. 8). These extraordinary bodies at once recall the corresponding structures in *Limnocodium* described by Professor Ray Lankester*, to which they bear a remarkably close resemblance. At the same time they differ in structure from all other sense-organs hitherto described in Medusæ, the chief difference between the marginal bodies of *Limnocnida* (as I shall call the Tanganyika Medusa) and those of *Limnocodium* consisting in the absence of any tubular extension of the capsules into the adumbral ectoderm layer of the velum as is the case in *Limnocodium*. Another less important point of difference lies in the marked contrast between the granular basal cells and the refringent apical cells in the marginal bodies of *Limnocnida*. However, in spite of these differences there is a very great similarity of structure in the organs of both, and probably the marginal bodies of *Limnocnida* will be shown to be endodermal in origin, just as the "refringent bulbs" of *Limnocodium* have been proved to be.

Among the individuals of *Limnocnida* examined some were found to have the outer wall of the manubrium quite smooth, while others have the proximal half of the manubrium covered with small swellings visible to the naked eye. When subjected to microscopic examination the individuals with the smooth manubriums turned out to be males and females with the external wall of the manubrium covered with spermatozoa or ova in all stages of development.

The other set of individuals with the small swellings proved to be examples showing stages of bud-formation. Buds may originate anywhere on the basal half of the manubrium, so that in some specimens several rows of buds occur, completely encircling that organ.

As far as the method of bud-formation has been observed at present, it appears that the young buds first arise as outgrowths on the external wall of the manubrium. Besides these, a certain number of older buds with rudimentary tentacles occur, projecting into the stomach and presenting the appearance of having actually grown through the

* "On *Limnocodium Sowerbii*, E. Ray Lankester," Quart. Journ. Micr. Sci. vol. xx., 1880.

wall of the manubrium. I hope, however, to be able to supply further details of this interesting process of bud-formation in a subsequent paper.

As the Tanganyika Medusa is still without a generic name, I propose that of *Limnocnida* for it, with the following characters:—

Limnocnida, gen. nov.

Umbrella flat, almost disk-like, about four times as broad as high, with a lens-shaped thickening in the middle. Tentacles very numerous, hollow, with bases partly imbedded in and adnate to the umbrella margin. Marginal sense-organs situate along line of attachment of velum, composed of a multicellular mass of refringent cells enclosed in a roundish capsule. Mouth round, two thirds the diameter of animal. Manubrium very short. Stomach shallow, of same diameter as mouth. Radial canals four. Reproduction by budding. Sexual organs situated on the manubrium.

Limnocnida tanganjicæ (Böhm).

Size: diameter of umbrella $\frac{7}{8}$ inch.
Loc. Lake Tanganyika.

As my knowledge of the significance of several points observed in the general anatomy of this freshwater Medusa is as yet very imperfect, I must reserve a more detailed account of these, as well as all discussion of the probable affinities and systematic position of *Limnocnida*, for another paper. If a place has to be found for *Limnocnida* in Hæckel's System of Medusæ we are beset with almost the same difficulties as those which presented themselves in the case of *Limnocodium*. The same battle will have to be fought over again, only the field is changed. Those who considered *Limnocodium* to be one of the Leptomedusæ will refer *Limnocnida* to the Anthomedusæ, while those who regarded *Limnocodium* as one of the Trachomedusæ will have to place *Limnocnida* among the Narcomedusæ.

EXPLANATION OF THE PLATES.

Plate XIII.

Fig. 1. Side view of *Limnocnida tanganjicæ*, × 4.
Fig. 2. Ventral view of ditto, × 3.
Fig. 3. Ventral view of a portion of the periphery of the disk, × 9.

PLATE XIV.

Fig. 4. Diagram of a transverse section passing along a radial canal on the right hand side but not on the left.
Fig. 5. A radial section cut a little to one side of the opening of a radial canal into the ring-canal, × 60.
Fig. 6. A portion of a tentacle, showing the arrangement of thread-cells.
Fig. 7. A tangential section through two adjacent marginal sense-organs.
Fig. 8. A marginal body seen in longitudinal optical section.

c.c. Circular canal.
ect. Ectoderm.
e.l. Endoderm lamella.
end. Endoderm.
gem. Medusa buds.
IR. Interradial tentacle.
mn. Manubrium.
ms. Mesoglœa.
m.v. Muscles of velum.
R. Radial tentacle.
r.c. Radial canal.
s. Marginal sense-organ.
te. Tentacle.
v. Velum.

XLVI.—*Notes on a Specimen of Sowerby's Whale* (Mesoplodon bidens*), *stranded on the Norfolk Coast.* By T. SOUTHWELL, F.Z.S., and SIDNEY F. HARMER, M.A., F.Z.S.

[Plate XV.]

ON the 19th December, 1892, we received intimation that a "large fish" accompanied by a young one had come ashore on the previous day at Overstrand, near Cromer, and on the following day we visited Overstrand together with the expectation of seeing one of the commoner species of Cetacea, but were agreeably surprised to find that the animal which had been stranded was a fine adult female specimen, 16 feet 2 inches in length, of Sowerby's Whale. It had been discovered on the morning of the 18th December left in shallow water by the receding tide, still alive but feeble, and, after being anchored to the shore for security, had been placed on a trolly and carried to the top of the cliff; it died, however, before it was taken from the water. Previously to our arrival on the scene it had been eviscerated, and was lying in a shed on the top of the cliff, a fœtus, 5 feet 2 inches long, having been extracted from it.

* Professor Sir W. Turner, in a recent paper on its occurrence in the Firth of Forth, has adopted the generic name *Micropteron* for this animal, as proposed by A. Wagner in 1846, and used by Eschricht and G. Cuvier; but for the reasons assigned by Professor Sir W. Flower, in a footnote to his paper on the "Recent Ziphioid Whales" (Tr. Z. S. viii. p. 208), we prefer to retain the more familiar term *Mesoplodon*, as applied by M. P. Gervais in 1850.